STATE OF VERMONT
PUBLIC SERVICE BOARD

Amended Petition of Entergy Nuclear Vermont Yankee, LLC, and Entergy Nuclear Operations, Inc. for amendment of their Certificate of Public Good and other approvals required under 30 V.S.A. § 231(a) for authority to continue after March 21, 2012, operation of the Vermont Yankee Nuclear Power Station, including the storage of spent nuclear fuel	))))))	Docket No. 7862

DIRECT TESTIMONY OF SETH G. PARKER
ON BEHALF OF THE
VERMONT DEPARTMENT OF PUBLIC SERVICE

October 22, 2012

Summary: Mr. Parker's testimony addresses five broad issues: (i) the reliability need of the Vermont Yankee Nuclear Power Station (the "VY Station"), (ii) market energy price impacts of the VY Station, (iii) market capacity price impacts of the VY Station, (iv) environmental impacts of the VY Station, and (v) economic impacts of the VY Station. Mr. Parker concludes that the VY Station is not necessary to ensure system reliability in Vermont or the region in all but one of the next eight years, and that retirement of the VY Station would not have affected market capacity price due to the region's capacity surplus and will not significantly raise market energy prices. Mr. Parker also concludes that the rates paid by most Vermonters are unlikely to be affected by any change in market energy or capacity prices due to the retirement of the VY Station because Vermont's largest utilities obtain most of their energy and capacity requirements from sources that insulate the, from fluctuations in market prices. Mr. Parker finally concludes that the effects on air emissions and employment of the VY Station's retirement have been overstated.

Mr. Parker sponsors the following exhibits:

Exhibit PSD-SGP-01	Seth G. Parker resume
Exhibit PSD-SGP-02	ISO-NE letter to Marc Potkin Re: Dynamic De-List Bid for Vermont Yankee Nuclear Power Station: Capacity Commitment Period, June 2013 – May 2014, May 10, 2012
Exhibit PSD-SGP-03	ISO-NE FCA #6 Results Filing, FERC Docket No. ER12-1678-000, April 30, 2012
Exhibit PSD-SGP-04	Transcript of CVPS Q1 2011 Earnings Conference Call—Final, May 6, 2011

Exhibit PSD-SGP-05	Green Mountain Power FERC Form 3-Q for Q1 2012
Exhibit PSD-SGP-06	ISO-NE filing: Revisions to Attachment K and Market Rule 1 Regarding How Resources Needed for Reliability are Treated in the Regional System Transmission Planning Process, June 1, 2012, FERC Docket ER12-1914-000.
Exhibit PSD-SGP-07	ISO-NE Whitepaper: Addressing Gas Dependence, July 30, 2012
Exhibit PSD-SGP-08	US-Canada Power System Outage Task Force: Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations, Chapter 8. Performance of Nuclear Power Plants Affected by the Blackout, April 2004
Exhibit PSD-SGP-09	ISO-NE New England Wind Integration Study, December 5, 2010
Exhibit PSD-SGP-10	Mr. Potkin's response in A.PSD:EN.2-131
Exhibit PSD-SGP-11	Mr. Potkin's response in A.PSD:EN.2-132
Exhibit PSD-SGP-12	Mr. Tranen's response in A.PSD:EN.1-60
Exhibit PSD-SGP-13	Dr. Lester's response in A.PSD:EN.2-139
Exhibit PSD-SGP-14	Mr. Heaps' response in A.PSD:EN.2-109

Q1. State your name and occupation, and describe your company.

A1. I am Seth G. Parker, a Vice President and Principal of Levitan & Associates, Inc. ("LAI"), a management consulting firm specializing in the power and fuels markets. I joined LAI in 1998. LAI is located at 100 Summer Street, Suite 3200, Boston, MA, 02110. Since its founding in 1989, LAI has conducted numerous assignments in New England and other markets throughout the U.S. and Canada. These assignments have encompassed diverse matters pertaining to project evaluations, price forecasts, competitive power market design, power plant valuation, bulk power security, power and fuel procurements, contract structures, gas supply, storage, and transmission, fuel infrastructure, and risk management. LAI's clients include utilities, power and gas suppliers, Independent System Operators ("ISOs") and Regional Transmission Organizations ("RTOs"), end-users, state regulatory commissions, and financial institutions.

Q2. Please describe your professional experience and qualifications.

A2. I am an economic and financial manager with over 30 years of international experience in power and fuel project development, evaluation, financing, and transactions. I have been responsible for modeling and analyses of independent and utility-owned generation and transmission projects, as well as market design, regulatory policy, contract restructuring, power economics, and asset valuation assignments. My power market experience includes many assignments in the competitive power markets of the Independent System Operator - New England ("ISO-NE") and other ISOs and RTOs. These assignments have included establishing competitive market parameters that determine load payments and

generator revenues, forecasting wholesale market power prices, projecting power plant revenues and costs, and calculating the impact of generation and transmission changes in competitive markets.

Q3. What were your previous positions and your educational background?

A3. Before joining LAI, I worked as a consultant and officer of Stone & Webster Management Consultants, Inc., an advisory firm that provided business, technical, strategic management, economic, financial, and regulatory consulting services in the power, fuels, process, and infrastructure industries. While at Stone & Webster, I was responsible for due diligence and market reviews of many proposed power, fuel, and infrastructure projects in the U.S. and abroad for commercial banks, investment banks, multilateral lending agencies, and other financial institutions. I have also worked in the Treasurer's Office at Pacific Gas & Electric, and have been involved in project development and financing activities at ThermoElectron Energy Systems and J. Makowski Associates, Inc.

My educational background includes an Sc.B. in Applied Mathematics / Economics from Brown University and an M.B.A. in Finance / Operation Research from the Wharton Graduate School at the University of Pennsylvania. I have taught undergraduate-level finance courses as an adjunct faculty lecturer and have taken additional course work in Basic Gas Turbine Technology and International Political Economics. My resume, provided as Exhibit PSD-SGP-01, contains additional details as well as a list of my expert reports and testimony.

Q4. On whose behalf are you offering this testimony?

A4. This testimony is offered on behalf of the Vermont Department of Public Service ("PSD").

Q5. Have you previously testified before the Vermont Public Service Board, on behalf of the PSD, or in other similar proceedings?

A5. Yes. Three of my past assignments are of particular relevance in this matter. First, I estimated (i) the market value of Entergy Corporation's Indian Point nuclear power station in New York and (ii) retirement impacts on market power prices and the local economy for the County of Westchester and its Public Utility Service Agency. Second, I testified on behalf of the PSD in Docket 7404 before the Vermont Public Service Board concerning Entergy Corporation's proposed restructuring of its merchant nuclear generating assets, including the VY Station. Third, I submitted a declaration and expert report on behalf of the State of Vermont to the U.S. District Court for the District of Vermont in Civil Action No. 11-cv-99 concerning Entergy Nuclear Vermont Yankee and Entergy Nuclear Operations, Inc.'s (collectively "Entergy") request to enjoin operation of certain Vermont laws.

Q6. Did you prepare this testimony yourself?

A6. I have personally conducted or supervised the work of LAI consultants who prepared this testimony.

Summary

Q7. What issues do you address in your testimony?

A7. I address five broad issues: (i) the reliability need of the Vermont Yankee Nuclear Power Station (the "VY Station"), (ii) the market energy price impacts of the VY Station, (iii) the capacity price impacts of the VY Station, (iv) environmental impacts of the VY Station, and (v) economic impacts of the VY Station.

Q8. What are your conclusions on these five issues?

A8. *First*, I conclude that the VY Station is not necessary to ensure system reliability in Vermont or in the region. ISO-NE has determined that the VY Station will not be required for reliability through 2020 once ISO-NE implements planned transmission improvements except for one year, Commitment Period 2014-2015, which ISO-NE is in the process of evaluating. The claims that witnesses for Entergy Nuclear Vermont Yankee, LLC, and Entergy Nuclear Operations, Inc. ("Entergy") have made that the VY Station is necessary for reliability are vague and unsupported.

Second, I conclude that retirement of the VY Station will not significantly raise market prices. The magnitude of any impact on market energy prices depends entirely on the shape of the generators' energy bid curve in the segment close to the ISO-NE system demand. The reduction claimed by Entergy witnesses is exaggerated and unsupported. Moreover, the ratepayers of Green Mountain Power ("GMP"), which now includes Central Vermont Public Service ("CVPS") and serves a majority of Vermont's customers, are well-insulated from any change in market energy prices because GMP

obtains almost all of its energy requirements from its own generating resources and from numerous Power Purchase Agreements ("PPAs") with other generators.

Third, I conclude retirement of the VY Station would not have affected market capacity prices through May 2016 and is unlikely to have a material impact in the following year. ISO-NE has had a surplus of generating capacity over the past six years based on the Forward Capacity Auction ("FCA") results, which has held down capacity prices. Had the VY Station retired in any of those years, the market capacity price would not have been affected because the FCAs cleared at the floor price with a large capacity surplus. The VY Station's capacity contributes to this surplus. Given the fact that GMP obtains almost all of its capacity from its own power plants and from numerous PPAs, Vermont ratepayers would not have paid higher market capacity prices.

Fourth, I conclude that Entergy witnesses overstated the effect of retirement of the VY Station on air emissions by other ISO-NE generators.

Fifth, I conclude that retirement of the VY Station will likely result in some lost jobs and tax payments in Vermont, but not as much as Entergy's witnesses have claimed.

The VY Station Is Not Needed For Reliability

Q9. What entity establishes reliability requirements for New England, and what entity is responsible for assuring reliability?

A9. ISO-NE is responsible for ensuring the reliability of the New England bulk power system. The bulk power system is comprised of generating stations and the high voltage transmission system that delivers electricity to electric utilities and other load-serving

entities. ISO-NE ensures that operation and planning of the New England bulk power system complies with reliability standards set by (i) the North American Electric Reliability Corporation ("NERC"), (ii) the Northeast Power Coordinating Council ("NPCC"), and (iii) ISO-NE's own operating and planning procedures.

Q10. What are ISO-NE's other responsibilities?

A10. ISO-NE administers New England's wholesale energy market, centrally dispatches the generation stations, and directs the flow of electricity across New England's bulk power system to ensure reliable electric service supplies for New England ratepayers. In addition, ISO-NE administers New England's wholesale electric capacity market and conducts comprehensive long-term planning studies to ensure New England's long-term electricity needs.

Q11. In light of ISO-NE's responsibility for ensuring reliability, what would ISO-NE do to maintain the reliability of the bulk power system in the event that the VY Station is retired?

A11. ISO-NE will take whatever actions are necessary to maintain the reliability of the bulk power system under all conditions, including the retirement of the VY Station, in order to comply with mandatory NERC and Northeast Power Coordinating Council NPCC standards. ISO-NE has explicitly confirmed this in its August 30, 2010 filing to the Federal Energy Regulatory Commission ("FERC") in Docket ER10-2477-000 on the results of FCA #4 for Commitment Period 2013-14: "If the Vermont Yankee license is

not extended, the ISO will take whatever actions are necessary to maintain the reliability of the New England electric system." Accordingly, the retirement of the VY Station would not threaten the reliability of the New England system since ISO-NE would take the necessary steps to make sure reliability is not compromised.

Q12. What actions have Entergy taken in regards to the reliability of the ISO-NE bulk power system?

A12. Under ISO-NE's Forward Capacity Market ("FCM"), supply-side and demand-side capacity suppliers participate in FCAs to supply capacity to the market. If a capacity supplier is chosen in an FCA, it is paid a market capacity clearing price set when the quantity of capacity remaining in the auction equals ISO-NE's Installed Capacity Requirement ("ICR"), or when the floor price is reached, whichever comes first. Under the FCM construct, existing capacity resources may submit de-list bids that specify the price below which that resource is unwilling to supply capacity. If an FCA clears at a price below a capacity resource's de-list bid, the de-list bid is effectively accepted and that resource will not be obligated to supply capacity during the applicable Commitment Period. If, however, that resource is needed for reliability, the de-list bid is rejected. In some cases the reliability issue is resolved and ISO-NE may retroactively accept the de-list bid.

As I discuss in more detail below, Entergy has offered to de-list the VY Station's capacity in the last three ISO-NE capacity auctions. In each of those FCAs, ISO-NE assessed Entergy's de-list bid and accepted it only if the loss of the VY Station's capacity

would not violate any NERC, NPCC, or ISO-NE reliability criteria. Once a de-list bid is accepted, that capacity resource would not have a Capacity Supply Obligation ("CSO"). ISO-NE would reject Entergy's de-list bid only if the loss of the VY Station's capacity would result in a reliability violation. Moreover, ISO-NE has evaluated the long-term reliability impacts of the VY Station's retirement, and developed a preferred set of transmission solutions that eliminates any reliability need for the VY Station.

Q13. Is the VY Station needed for reliability going forward?

A13. The best way to answer that question is to review the results of the last three capacity auctions, because ISO-NE only counts capacity that has cleared in those auctions in its reliability assessment. The VY Station is tentatively required in only one of the next three years for which ISO-NE has conducted a capacity auction. Entergy submitted de-list bids for three FCAs: #4 for Commitment Period 2013-2014, #5 for 2014-2015, and #6 for 2015-2016. ISO-NE determined that the VY Station will not be needed for reliability purposes in two of those periods, 2013-2014 and 2015-2016, and thus accepted Entergy's de-list bids for those Commitment Periods.

Q14. Please review the results of each of those three FCAs.

A14. In FCA #4 conducted on August 2-3, 2010, ISO-NE originally rejected the VY Station's de-list bid for the Commitment Period 2013-2014. Afterwards, however, ISO-NE completed reliability studies using updated assumptions, including three transmission upgrades that would be in-service for that Commitment Period and new capacity

resources procured during FCA #4. As a result of those updated studies, ISO-NE sent a letter dated May 10, 2012 to Mr. Marc Potkin (Exhibit PSD-SGP-02) informing Entergy that the VY Station was not needed for Commitment Period 2013-2014. In particular, the letter noted that three transmission upgrades have been certified to be in-service for that Commitment Period.

Entergy submitted a de-list bid in FCA #5 for Commitment Period 2014-2015. The de-list bid was rejected by ISO-NE for reliability reasons. However the issue of the appropriate compensation for the VY Station was set for hearing and settlement judge procedures. A Settlement Agreement was filed on September 14, 2012, that contains provisions of how the VY Station shall be treated in FCA #5 under four possible scenarios, the first of which involves ISO-NE notifying Entergy prior to June 1, 2013 that the reliability need for the VY Station has been met. If that is the case the VY Station will be de-listed from FCA #5 and will not have a CSO for the 2014-2015 Commitment Period. ISO-NE has not yet completed its studies to determine if the VY Station is required for reliability, but as I indicated above, ISO-NE will take "…whatever actions are necessary to maintain the reliability of the New England electric system."

In FCA #6 for Commitment Period 2015-2016, ISO-NE determined that the VY Station was not needed for reliability based on the expectation that certain transmission upgrades will be in place prior to the 2015-2016 period as well as new capacity resources that were procured in that FCA. On page 9 of ISO-NE's filing to FERC in ER12-1678-000 with the results of FCA #6, (Exhibit PSD-SGP-03) ISO-NE noted:

> This determination is based on the expectation that certain transmission upgrades will be in place prior to the 2015-2016 capacity Commitment Period as well as new resources which have been procured through the Forward Capacity Market.

According to ISO-NE's filing, the VY Station was one of 191 de-list bids totaling 1,868MW. ISO-NE accepted 185 de-list bids, representing a total of 1,789MW of capacity. In accepting the majority of these de-list bids, ISO-NE justified this acceptance "…because the ISO determined that system reliability can be maintained without relying on these resources."

Q15. Is it possible that the VY Station could become a capacity resource for the Commitment Periods in which its de-list bid was accepted?

A15. Yes, the VY Station is eligible to participate in the Annual Reconfiguration Auctions for those Commitment Periods and take on a CSO. Even if the VY Station obtains a CSO, its capacity will not be required for reliability since ISO-NE has already completed FCAs 4 and 6.

Q16. From an economic point of view, would it make sense for the VY Station to take on a capacity supply obligation in an Annual Reconfiguration Auction?

A16. No, because prices in Annual Reconfiguration Auctions have typically been much lower that in the FCA for that same Commitment Period, so it may not make economic sense for the VY Station to seek a capacity supply obligation for a Commitment Period in which it submitted a de-list bid. For example, the VY Station's de-list bid in FCA #4 for

Commitment Period 2013-2014 was $3.933/kW-month and that FCA cleared at $2.95/kW-month. Recently, the second Annual Reconfiguration Auction for that Commitment Period cleared at only $0.50/kW-month, a small fraction of the VY Station's de-list bid and of the FCA price. More importantly, the VY Station is not needed for system reliability in that Commitment Period.

Q17. Please summarize your position on the necessity of the VY Station to assure the near-term reliability of the ISO-NE bulk power system.

A17. ISO-NE is taking the necessary steps to ensure that reliability will not be compromised by the retirement of the VY Station. The VY Station may continue to operate but is not required to operate in Commitment Periods 2013-2014 and 2015-2016. The necessary transmission infrastructure is being put in place and there are sufficient capacity resources without the VY Station for those two years. ISO-NE is in the process of making a determination for Commitment Period 2014-2015. Given those transmission improvements and the additional capacity resources being developed, it is unlikely that the VY Station will be required for reliability purposes after Commitment Period 2015-2016.

Q18. What are the Vermont electric utilities doing to replace VY Station capacity in case it retires?

A18. In addition to the actions being taken by ISO-NE, Vermont utilities have options to fulfill their customers' needs if the VY Station retires. For example, in its May 6, 2011, First

Quarter 2011 Earnings Conference Call, CVPS addressed its past and pending efforts to plan for the VY Station's retirement. According to a Transcript of CVPS Q1 2011 Earnings Conference Call—Final (May 6, 2011) (Exhibit PSD-SGP-04), Larry Riley, President and CEO of CVPS stated:

> Given the contention around Vermont Yankee, we have always planned simultaneously for a future, both with and without the plant. We have a plethora of options available, and the nearly half-dozen contracts we have signed over the past couple of years, along with improvements to our own generation sources, has reduced our need after March 2012, to less than 90 megawatts on peak.
>
> Given the wide array of options available in New England, we are confident that we'll be able to fill our portfolio with affordable energy that complements our existing supplies and meets Vermonters' expectations for continued low-carbon energy mix. (underlining added for emphasis).

Q19. Now that GMP and CVPS have merged, have their positions changed regarding the replacement of VY Station capacity?

A19. No, their positions have not changed. In GMP's 2012 Q1 financial report, (Exhibit PSD-SGP-05), GMP stated:

> The Company [GMP] has no continuing obligation to purchase power from ENVY, subsequent to the March 21st, 2012 power contract expiration date. The Company has contracts for power supply to replace most of this power, on a short- and long-term basis. The most notable of these new resources (summarized

below) are system energy purchases with terms up to 5 years, a new long-term power contract from NextEra Seabrook LLC, and new long-term wind power resources. Considering these new resources, the Company's power supplies are sufficient to meet more than 90% of the company's projected energy requirements through 2014. Adequate resources exist in the New England wholesale electricity market to permit the Company to obtain additional replacement resources in future years.

(Underlining added for emphasis).

Q20. Which Entergy witnesses addressed reliability issues associated with the VY Station?

A20. Reliability issues were primarily addressed by Mr. Jeffrey Tranen, and were briefly mentioned by Mr. Potkin and Dr. Richard K. Lester.

Q21. Is your description of ISO-NE's reliability responsibilities consistent with Mr. Tranen's Prefiled Testimony?

A21. Yes, it is.

Q22. Are the FCA results you provide above consistent with the testimony of Entergy witness Mr. Tranen?

A22. Yes, Mr. Tranen presented these same FCA results on page 6 of his Prefiled Testimony. Mr. Tranen went on to state that the VY Station may be needed in the future due to "…significant uncertainty regarding ISO-NE's need for resources." As I explain below,

however, such long-term planning uncertainties are extremely unlikely to require VY Station capacity in the future.

Q23. On page 6 of his Prefiled Testimony, Mr. Tranen said that it is "…possible that ISO could determine that VY is needed for reliability reasons for the period after 6/1/16…" What is your understanding of this statement?

A23. Mr. Tranen discussed long-term planning uncertainties regarding ISO-NE's potential need for resources to justify his position that the VY Station may be needed at some point in the future. Mr. Tranen noted that the ISO-NE reliability studies "…are very dependent on the assumed system conditions…" regarding customer demand, generating resources, and transmission infrastructure. He claimed that these conditions can change over time, "…thus it is not known with any degree of certainty at this time whether ISO-NE would require the VY Station's continued operation for reliability for the period after 6/1/16."

Q24. Do you agree with his position?

A24. Mr. Tranen failed to acknowledge that ISO-NE has already considered long-term uncertainties and has studied the long-term reliability impacts and need for the VY Station. ISO-NE made the following statement on page 6 of its June 1, 2012 filing to FERC in Docket ER12-1914-000, "Revisions to Attachment K and Market Rule 1 Regarding how Resources Needed for Reliability are Treated in the Regional System Transmission Planning Process." (Exhibit PSD-SGP-06). I note that the first line of this

quote below refers to Mr. Rourke's "testimony," an attachment to ISO-NE's FCA 6 filing to FERC.

> As Mr. Rourke explains in his testimony, while most resources with one-year de-list bids are not treated as unavailable in the base case for regional planning studies, there are exceptions where such a resource will be assumed to become unavailable within the ten-year planning horizon. In these cases where ISO-NE has information that the resource may not be able to continue to operate (even though the resource has submitted only single year de-list bids), ISO-NE will reflect the absence of that resource in the assessment of needs that must be addressed in the regional system planning process. ISO-NE took this approach, for example, with the Vermont Yankee nuclear station in recent years. The resource owner submitted one-year de-list bids, but because of the dispute between the State and Vermont Yankee's owner, ISO-NE treated the units as unavailable in its Needs Assessment. (underlining added for emphasis).

Q25. What was the Needs Assessment to which ISO-NE referred?

A25. ISO-NE conducted an analysis, the 2011 New Hampshire / Vermont Needs Assessment, to evaluate the reliability of the transmission system in those two states through the year 2020.

Q26. How was the potential retirement of the VY Station analyzed?

A26. On page 9 in the same FERC filing, Revisions to Attachment K and Market Rule 1, ISO-NE made the following statement that explained its analysis of the VY Station:

> ISO-NE utilized this type of flexibility in its study of the Vermont Yankee nuclear facility in the Vermont / New Hampshire Needs Assessment. In that case, the owners of Vermont Yankee had submitted successive one-year de-list bids. However, because of the dispute over the plant's authority to operate, a risk of the plant not being able to operate, ISO-NE treated the facility similar to a Permanent De-List in its planning studies. (underlining added for emphasis).

After ISO-NE completed the 2011 New Hampshire / Vermont Needs Assessment, ISO-NE conducted a Solutions Study to identify cost-effective transmission solutions that address the potential problems identified in the 2011 Needs Assessment. ISO-NE later prepared an April 12, 2012 Follow-Up Analysis to the New Hampshire / Vermont Solutions Study to reassess the preferred solutions in the Solutions Study. The Follow-Up Analysis utilized updated assumptions regarding interim FCA results, approved transmission projects, future load growth, and other factors. These studies are generally conducted using conservative assumptions, but the details cannot be released due to confidentiality requirements. However, I make the following general observations about ISO-NE's preferred solutions presented in the 2012 Follow-Up Analysis: (i) ISO-NE developed preferred solutions for two cases: with and without the VY Station. (ii) The costs of the preferred solutions for those two cases are very close, within 3%, of one another. (iii) The cost of the preferred solution without the VY Station is actually lower than the cost with the VY Station in operation.

Q27. Did Mr. Tranen or Mr. Potkin refer to the 2012 Follow-Up Analysis and its conclusions about the VY Station?

A27. No. Mr. Tranen's claim that "…it is not known with any degree of certainty at this time whether ISO-NE would require the VY Station's continued operation for reliability for the period after 6/1/16" is inconsistent with the conclusions of ISO-NE's 2012 Follow-Up Analysis. The transmission upgrades that ISO-NE is putting into place are long-term investments to ensure that reliability will not be compromised if the VY Station retires. ISO-NE's long-term analysis indicates it is extremely unlikely that ISO-NE will require the VY Station for system reliability at any time after the 2014-2015 Commitment Period.

Q28. What is your opinion on Mr. Tranen's claim on page 7 of his Prefiled Testimony that "…the uncertainty regarding ISO-NE's need for resources is very high?"

A28. Mr. Tranen was speculating on ISO-NE's need for resources without providing any support. For example, Mr. Tranen noted that "[t]he largest uncertainty is created by the potential for significant retirement of coal and oil generating units over the next decade as a result of numerous environmental requirements." However, in Mr. Tranen's own words, "…it is unclear how much of the oil and coal generation capacity will be retired versus being retrofitted to stay in compliance with environmental regulations." Without analyzing the retirement versus repowering options that takes into account renewable energy and other resource development, it is merely speculation to state that there is "…significant uncertainty regarding ISO-NE's need for resources."

Mr. Tranen also does not take into consideration the existing surplus of capacity in New England and how that factors into any need for capacity for New England. ISO-NE had surplus capacity of 2,853MW in the most recent FCA #6. Moreover, ISO-NE's 2012 Capacity, Energy, Load, and Transmission ("CELT") Report shows more than sufficient capacity through 2021. According to part 1.1 of the 2012 CELT Report, ISO-NE will have installed capacity reserves of 5,828MW in 2021, equal to a 21% reserve margin, based on the Seasonal Claimed Capability of installed resources – generation, active demand response, and imports. This 21% reserve margin exceeds ISO-NE's current requirement.

Q29. What is your opinion on Mr. Tranen's claim on page 8 of his Prefiled Testimony that "Having the VY station operating provides a level of protection against generation shortages during this extended period of time?"

A29. Mr. Tranen appears to have suggested that ISO-NE would actually consider generation shortages to occur in New England. This is entirely contrary to ISO-NE's mandate and purpose. As I have noted before, ISO-NE is on record stating that they will take whatever actions are necessary to maintain the reliability of the bulk power system. I cannot envision any scenario under which ISO-NE would consider allowing generation shortages to occur.

Q30. Can you give an example where Mr. Tranen overstated the risk of older plants retiring and creating a need for new resources?

A30. Yes. On page 7 of his Prefiled Testimony, Mr. Tranen specifically mentioned that "…ISO-NE has seen older fossil-fired generator retirements, most recently with the announcement of the planned closure of Salem Harbor generating plant." Mr. Tranen neglected to mention that Salem Harbor, one of the oldest oil- and coal-fired plants in New England, was acquired by Footprint Power, a private power plant developer. Footprint Power has announced plans to replace Salem Harbor with a 630MW quick-start gas-fired combined cycle plant with an additional 62MW of peaking capacity. Footprint Power filed a petition in August 2012 to construct the new plant with the Massachusetts Energy Facilities Siting Board in Docket EFSB 12-2.

Q31. Will the retirement of Salem Harbor create a need for new resources?

A31. No. Salem Harbor's retirement will not create a need for new resources if Footprint Power is successful in its combined cycle development effort. A new gas-fired combined cycle plant would be much more efficient, flexible, and cleaner than the existing Salem Harbor units. The new combined cycle plant would use only 16 acres of the existing 65 acre site, freeing up the rest of the existing site for residential and mixed use development. Thus, the retirement of the existing Salem Harbor plant would be an improvement for ISO-NE and the local community.

Q32. Are there other examples in the ISO-NE market of new technologies replacing older generating capacity on the same site?

A32. Yes. Sithe Power developed Mystic Units 8 and 9, which now provides 1,550MW of combined-cycle generation in downtown Boston, at the same site as Mystic Units 4, 5, and 6, three old oil-fired units that were retired in December 2003. As with Salem Harbor, the replacement of the old Mystic units with new more efficient, flexible, and cleaner gas-fired combined cycle plants is inconsistent with Mr. Tranen's contention that the VY Station is needed because older plants might retire.

Q33. Did Mr. Tranen raise the risk of other plant retirements and is his concern reasonable?

A33. Mr. Tranen incorporated a quote from the bottom of page 7 and the top of page 8 of an ISO-NE Discussion Paper: Aligning Markets and Planning. Mr. Tranen claimed that ISO-NE also "…considers it plausible that over 5,000 MW – a sixth of the generation fleet – may permanently shut down over the coming decade." However, this document is a Discussion Paper "…intended to facilitate discussion of technical market, planning, and operational issues among stakeholders and ISO staff." It was designed to allow stakeholders and staff to consider the proposition that "…some reliability needs presently met with cost-of-service transmission investments could, in principle, be satisfied with competitively-procured capacity resources." We should keep in mind that the Discussion Paper is neither a forecast of plant retirements nor a technical study that can support Mr. Tranen's position.

Q34. In your opinion did Mr. Tranen provide any evidence that the potential retirement of the VY Station would be considered a reliability risk by ISO-NE?

A34. No he did not. He raised the specter of reliability problems and concerns, but as I have mentioned before, (i) in the near term, ISO-NE has made FCA determinations on the VY Station's de-list bids, and (ii) in the long-term, ISO-NE has taken and will continue to take whatever actions are necessary to ensure that reliability will not be compromised by the retirement of the VY Station.

Q35. Did Mr. Tranen raise other potential risks to support keeping the VY Station in operation?

A35. Yes, Mr. Tranen raised the issue of fuel diversity on page 8 of his Prefiled Testimony, specifically ISO-NE's concern about "…increased reliance on natural gas-fired capacity…" as one of five Strategic Planning risks in the report: Using the Forward Capacity Market to Meet Strategic Challenges. However, Mr. Tranen's testimony did not reference or acknowledge the ongoing investigations being conducted by ISO-NE, other ISOs / RTOs, and FERC to assess the true risk and to develop market-based mechanisms to resolve any potential problems.

Q36. What is ISO-NE doing to address the related issues of fuel diversity and increased reliance on natural gas?

A36. ISO-NE is in the process of facilitating discussion among the six New England states and stakeholders to address the challenges associated with gas dependence. Since it published the Strategic Challenges report, ISO-NE released a July 2012 draft Whitepaper, Addressing Gas Dependence, that discusses the challenges posed by increasing dependence on gas-fired generation and the solutions, such as aligning the gas and

electric schedules, changing FCM rules, and other information enhancements. The Strategic Challenges Whitepaper is attached as Exhibit PSD-SGP-07. According to this whitepaper, ISO-NE has been studying this issue for the past two years and is utilizing a stakeholder process to implement solutions and prepare ISO-NE for gas supply contingencies.

On page 9 of his Prefiled Testimony, Mr. Tranen referred to NERC's 2011 Long Term Reliability Assessment that provided an "…assessment of whether the power system will be adequate for the forecast supply and demand conditions."

Q37. What does the NERC's 2011 Assessment say about long term reliability in New England?

A37. According to page 293 of the NERC Assessment, it does not forecast any major reliability issues in New England:

> …ISO New England Inc. (ISO-NE) forecasts no major reliability issues with respect to fuel supply, availability of both supply or demand-side resources, or the capability of the regional transmission system to serve the projected seasonal peak demands and energy requirements of the six-state New England sub-region. (underlining added for emphasis).

The NERC Assessment also noted on page 296 that "[t]herefore, ISO-NE does not expect to face any installed capacity shortages in the future."

Q38. What was the most significant issue identified in the NERC Assessment?

A38. According to page 294 of the NERC Assessment, "…the most significant issues facing New England have been to maintain the general performance of the long 345 kV corridors, maintain the reliability of supply to serve demand, and develop the transmission infrastructure to integrate generation throughout New England." Mr. Tranen did not mention these most significant issues or the progress being made to resolve them. The NERC Assessment states on the same page that "[s]ystem upgrades, which are either in progress or have been recently completed, provide significant relief for these areas." ISO-NE has recognized and is resolving the most significant reliability issues.

Q39. What other issues did the NERC Assessment identify?

A39. Page 294 of the NERC Assessment identified two short-term issues and three long-term issues "…that could possibly impact future system reliability." I stress the conditional nature of the impact on future system reliability. Mr. Tranen mentioned three of these five issues on page of 9 of his Prefiled Testimony, with the proviso that these issues "…could possibly impact future system reliability."

Q40. Does the NERC Assessment specifically identify the retirement of the VY Station as an issue that could possibly impact future ISO-NE reliability?

A40. No it did not.

Q41. Later on page 9 of his Prefiled Testimony, Mr. Tranen referred to extreme circumstances like the 2003 blackout, and how "…in such cases local resources can be quite beneficial to maintaining system reliability." What is the benefit of a nuclear plant in the event of such an extreme circumstance?

A41. The benefit of a nuclear plant in extreme circumstances is no greater than for most other large power plants. By design, any nuclear plant exposed to voltage and frequency fluctuations from a pending blackout automatically disconnects itself from the grid and shuts down. This is accomplished as part of the plant's protective scheme to shield the plant from internal damage due to falling grid voltage and frequency. This is exactly what happened to nine nuclear plants in the eastern USA during the 2003 blackout to which Mr. Tranen refers in his testimony. Those plants experienced reactor trips, *i.e.*, rapid shutdowns as a consequence of the blackout across large portions of the Midwest, Northeast, and Ontario, Canada. The findings of the Nuclear Working Group established to support the U.S.-Canada Power System Outage Support Task Force, as contained in their Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations, determined that (i) the severity of the grid transient caused generators, turbines, or reactor systems at the nuclear plants to reach protective feature limits and actuate automatic protective actions, (ii) all the nuclear plants that shut down or disconnected from the grid responded automatically to grid conditions, and (iii) the nuclear plants responded to the grid conditions in a manner consistent with the plant designs. The relevant chapter of the Final Blackout Report is attached as Exhibit PSD-SGP-08.

Nuclear power plants are no more resilient to voltage and frequency fluctuations than other large power plants. Once the VY Station shut down and was disconnected from the bulk power system, it would not be able to contribute to system reliability. Moreover, the VY Station's start-up procedures, like most nuclear plants, would likely take too long for it to contribute to ISO-NE's initial system restart procedures. Mr. Tranen appears to have overestimated the benefits of a nuclear plant, particularly the VY Station, in the event of a major blackout.

Q42. Moving on to Dr. Lester, what was his reliability concern?

A42. On page 31-35 of his Prefiled Testimony, Dr. Lester addressed "…the reliability implications of depending upon intermittent power sources." He expressed concern that wind and solar generation "…must be backed up by other generating units on the system..." In particular, Dr. Lester stated that "In general, the larger share of intermittent power on the network, the more challenging the grid-integration issues become…" He went on to state "…as Vermont and other states in the region increase their sourcing of intermittent power, additional steps will have to be taken to ensure overall reliability of service." However, Dr. Lester did not address the particular situation in New England and did not estimate the level of wind penetration that would require such "additional steps," such as adding regulation services or more quick-start resources.

Q43. Has ISO-NE investigated these wind integration issues, and did Dr. Lester refer to the ISO-NE wind integration studies?

A43. The challenges of integrating wind and other intermittent renewable resources is a well-known and well-researched issue. ISO-NE released the New England Wind Integration Study ("NEWIS") dated December 5, 2010 that addressed the operational effects of large scale wind integration in New England. The NEWIS is attached as Exhibit PSD-SGP-09. Dr. Lester did not refer to NEWIS in his Prefiled Testimony.

NEWIS examined the four wind penetration scenarios from 2.5% (1.14GW) of the forecasted annual energy demand to 24% (9.7GW). NEWIS, on page 20, concluded that "[a]nalysis of these results indicates, assuming no attrition of resources capable of providing regulation capacity, that there may be adequate supply to match the increased regulation requirements under the wind integration scenarios considered." Thus there are enough generators capable of providing regulation service, and more of them may be required to provide regulation service in the future. In addition, ISO-NE may need to adjust the quantity daily as a function of forecasted and/or actual wind generation.

Q44. Could the VY Station provide such regulation service?

A44. No, nuclear plants in the U.S., including the VY Station, are not designed to provide regulation services.

Q45. Is wind integration as "challenging" an issue as portrayed by Dr. Lester?

A45. Significant additional penetration of wind generation in New England will increase the requirement for regulation service and may require daily adjustments, but the NEWIS

results do not suggest that ISO-NE will be unable to meet these requirements. It appears that Dr. Lester exaggerated the issue of integrating intermittent wind resources.

Q46. Moving on to Mr. Potkin, please comment on his statement on page 18 of his Prefiled Testimony that "…given the uncertainty of future needs and supply, the VY Station may be critical to the supply of energy to the region in the future".

A46. Mr. Potkin was responding to the opinions expressed by Mr. Tranen regarding the benefits the VY Station provides to the region. In his response, Mr. Potkin did not assert that the VY Station is needed or critical, only that the VY Station "…may be critical to the supply of energy to the region in the future." This vague claim is in contrast to the more assertive statements made by Mr. Tranen regarding the VY Station's reliability benefits and how the VY Station provides a level of protection against generation shortages. Mr. Potkin appears unsure whether the VY Station will be needed to maintain ISO-NE reliability in the future.

Q47. How did Mr. Potkin respond to Q.PSD:EN.2-131 in which he was asked under what circumstances the VY Station would be critical to the supply of energy in the region in the future and under what circumstances it would not be critical?

A47. In his response (Exhibit PSD-SGP-10), Mr. Potkin referred to FCAs #4 and #5 and concluded that, "[t]hough ISO-NE has recently accepted the VY Station's FCA #4 de-list bid, the FCA #5 de-list bid rejection remains in effect to preclude system-reliability violations." Mr. Potkin's response to Q.PSD:EN.2-131 does not explain why he stated

that the VY Station "…may be critical to the supply of energy to the region in the future." Moreover, he appears to not have taken into account ISO-NE's acceptance of Entergy's de-list bid for FCA #6, *i.e.* the VY Station is not needed for reliability for the 2015-2016 Commitment Period, or the Follow-Up.

Q48. Please comment on Mr. Potkin's statement on page 19 of his Prefiled Testimony that "[t]he ISO-NE studies are fluid, and subject to change" in his response to ISO-NE's determination that "…the VY Station was not required for reliability for the year 6/1/13 – 5/31/14 or for 6/1/15 – 5/31/16."

A48. Mr. Potkin appears to suggest that after ISO-NE determines that the VY Station is not required for reliability in an FCA, ISO-NE could later determine that the VY Station is in fact required. This is extremely unlikely. ISO-NE conducts detailed analyses to determine whether plants submitting de-list bids are needed for reliability using conservative assumptions that stress the bulk power system. The detailed analyses are described in Attachment B to ISO-NE's FERC filing with the results of FCA #6 (Exhibit PSD-SGP-03), the testimony of Stephen J. Rourke, ISO-NE Vice President of System Planning. ISO-NE's analyses include a transmission security analysis for all resources and a detailed transmission operability analysis for resources with specific nodal locations.

Q49. Please briefly describe the transmission security analysis and the transmission operability analysis that ISO-NE uses to evaluate de-list bids.

A49. As described by Mr. Rourke on pages 6 through 8 of his testimony attached to ISO-NE's FCA #6 Filing to FERC, the transmission security analysis is utilized as an initial reliability screen and also evaluates (i) the loss of the largest generating unit followed by the loss of the most critical transmission element, and (ii) the loss of the most critical transmission element followed by the loss of the next most critical transmission element. The transmission operability analysis uses power system software to perform detailed load flow analyses to evaluate contingency events wherein critical generation and/or transmission facilities are assumed to trip out-of-service or be unavailable. This analysis determines if the de-list bid capacity is needed to maintain system reliability so that the system is able to withstand the unplanned loss of system elements, even when the system is serving peak loads and is under stress. The transmission operability analysis models first contingency (N-1) and second contingency (N-1-1) events.

Q50. Given the detailed and conservative nature of these de-list bid analyses, is it likely that ISO-NE could accept a de-list bid and later reject it?

A50. No, it is extremely unlikely that after a accepting a de-list bid, such as for the VY Station, ISO-NE might later determine that the resource was needed for reliability. In fact, in the PSD's second set of information requests, Mr. Potkin was asked to provide any example in which ISO-NE initially determined that a resource was not needed for reliability and then revised its studies to determine otherwise. In his response in A.PSD:EN.2-132 (Exhibit PSD-SGP-11), Mr. Potkin stated that he "is unaware of any studies where ISO-

NE may have determined that a resource was not needed for reliability and then revised its studies to determine otherwise." I am not aware of any such studies either.

Q51. Please comment on Mr. Potkin's statement that "…the VY Station provides additional protection for the system's reliability should conditions depart from the ISO-NE assumptions."

A51. Mr. Potkin suggestion that the VY Station provides additional reliability value is contrary to how reliability determinations are made. ISO-NE makes reliability determinations based on strict set reliability standards that adhere to NERC and NPCC criteria. Either the reliability standard is met or not met.

VY Station Retirement Would Not Significantly Raise Vermont's Electricity Rates

Q52. Please explain how retail power rates paid by Vermont ratepayers are determined and what factors can affect them.

A52. Retail power rates are developed by the Vermont electric utilities and are submitted to the Board for approval. The Board considers the reasonableness and prudence of the utilities' underlying costs, including the costs of power from (i) PPAs, (ii) generating plants owned by the utilities, and (iii) purchases of wholesale power from markets administered by ISO-NE. In general, the utilities rely first on power from their PPAs and their own generating plants, and then purchase power from the wholesale market to meet any remaining load obligation. In this section I discuss PPA and wholesale power prices that are relevant to this proceeding.

Q53. How do the utilities determine whether a proposed PPA is in the best interests of the Vermont ratepayers?

A53. First and foremost, the utilities consider the price of the proposed PPA and the risks. In order for a PPA to be cost-effective and provide net benefits to ratepayers, its price should be competitive compared to comparable power supplies, adjusted for any risks. Comparable external supplies could include (i) other PPAs available to Vermont utilities and (ii) the expected market price for similar power supplies.

Q54. According to page 14 of the prefiled testimony of Entergy witness Mr. Potkin, GMP and CVPS rejected the PPA offered by Entergy to purchase power from the VY Station after March 21, 2012, because "[t]hey consistently said they need 'additional incremental value' meaning value above and beyond the existing RSA [Revenue Sharing Agreement]. In demanding such 'additional value,' they were asking for a below-market PPA." Is there something unusual with a purchaser asking for "…additional incremental value"?

A54. No, the utilities' position is consistent with standard negotiating and resource planning practices. Each party to a PPA negotiation will have its own view on future market power prices. In negotiating, speaking about a "below-market PPA" only makes sense when linked to a party's expectations of future market prices. If the utilities believed that purchases of market energy and capacity would be more economic than the PPA, then they would reject the PPA. Moreover, the utilities are already entitled to whatever benefit may accrue from the RSA in the event the VY Station's energy sale prices are higher than the RSA strike price. Thus it was entirely reasonable that those two utilities did not sign

a PPA that wouldn't provide any additional benefit compared to their forecast of market power prices plus the RSA benefits to which they are entitled.

Q55. Did Mr. Potkin address the utilities' valuation of the PPA prices compared to expected market prices?

A55. Yes, he stated that "In order to provide the additional value that the utilities wanted, the pricing would have to be even lower than what we had offered, even lower than what the market at the time was indicating…' Again, the position of the Vermont utilities was consistent with standard practices. Unless the PPA offered pricing below the market price the utilities would otherwise expect to pay, Vermont ratepayers would not be well-served.

Q56. Let's now turn to utility purchases of market-priced power. What are the major components of market power prices, and how are they set?

A56. There are two major components of the wholesale power market prices: energy prices and capacity prices. Market energy prices are set hourly based on the price of the marginal unit from bids submitted by generators and accepted by ISO-NE on a day-ahead basis. Generators committed by ISO-NE are paid the market energy price for that hour, and all New England utilities pay the hourly market energy price for any market energy they require to meet their load obligation.

Market capacity prices are set annually three years in advance of the actual Commitment Period under ISO-NE's FCM rules. Any generators willing to commit to

being operational in a Commitment Period participate in the FCAs. All capacity resources that clear an FCA receive the market capacity price for its capacity, subject to adjustments for surplus capacity. All load serving entities, including the Vermont utilities, pay market capacity prices for any market capacity they require to meet their reliability requirements.

Q57. Turning first to the ISO-NE energy market, does the VY Station participate in the ISO-NE energy market, and does the VY Station ever set the market energy price?

A57. Entergy submits energy bids for the VY Station along with all other generators that can provide electric energy to serve New England load. However, the VY Station seldom, if ever, actually sets the hourly market energy price. The VY Station is a baseload resource that operates whenever it is available, and thus is a price-taker in the day-ahead energy market. As with most nuclear plants, the VY Station was not designed to be cycled on and off, so it is virtually never the marginal unit that sets the hourly market energy price in New England.

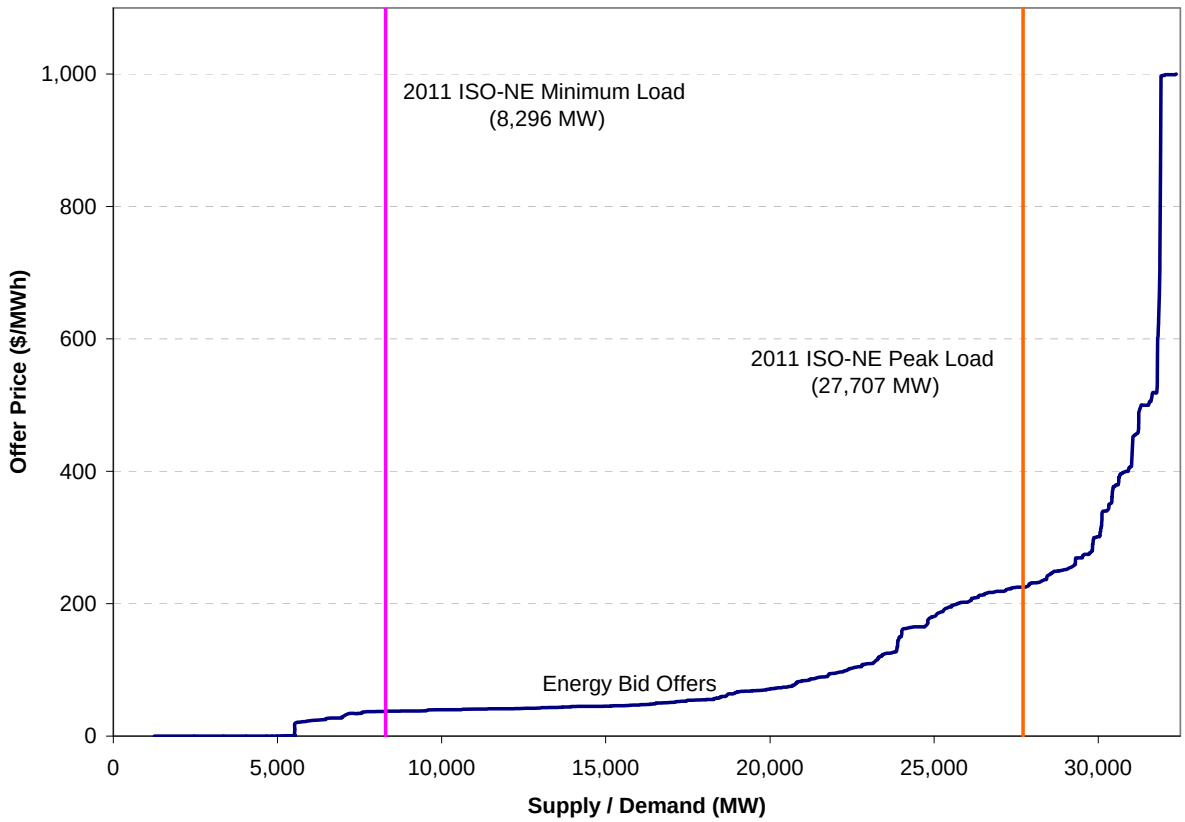
Q58. How would retirement of the VY Station affect market energy prices?

A58. Without chronological dispatch simulation modeling, it is difficult to precisely calculate the VY Station's impact on ISO-NE market energy prices. In short, the VY Station's impact depends on the shape of the generators' energy bid curve. If the segment of the energy bid curve is flat in the region of New England's demand for a particular hour, then retiring the VY Station would not materially affect market energy prices. On the other

hand, if the energy bid curve is upward sloping in that segment for a particular hour, then retiring the VY Station would increase market energy prices.

To illustrate my point, I plotted the ISO-NE energy bids for the afternoon of July 20, 2011 along with the ISO-NE peak and minimum loads for 2011. Two findings can be observed: (i) the section of the energy bid curve with the steepest slope is to the right of the peak demand and is virtually never encountered, and (ii) the relatively flat section of the energy bid curve, up to approximately 16,000MW, accounted for 68% of the hours in 2011.

Figure 1: ISO-NE Energy Bid Curve for Hour 15 July 20, 2011 with 2011 Minimum and Maximum System Loads (*Source: ISO-NE)*

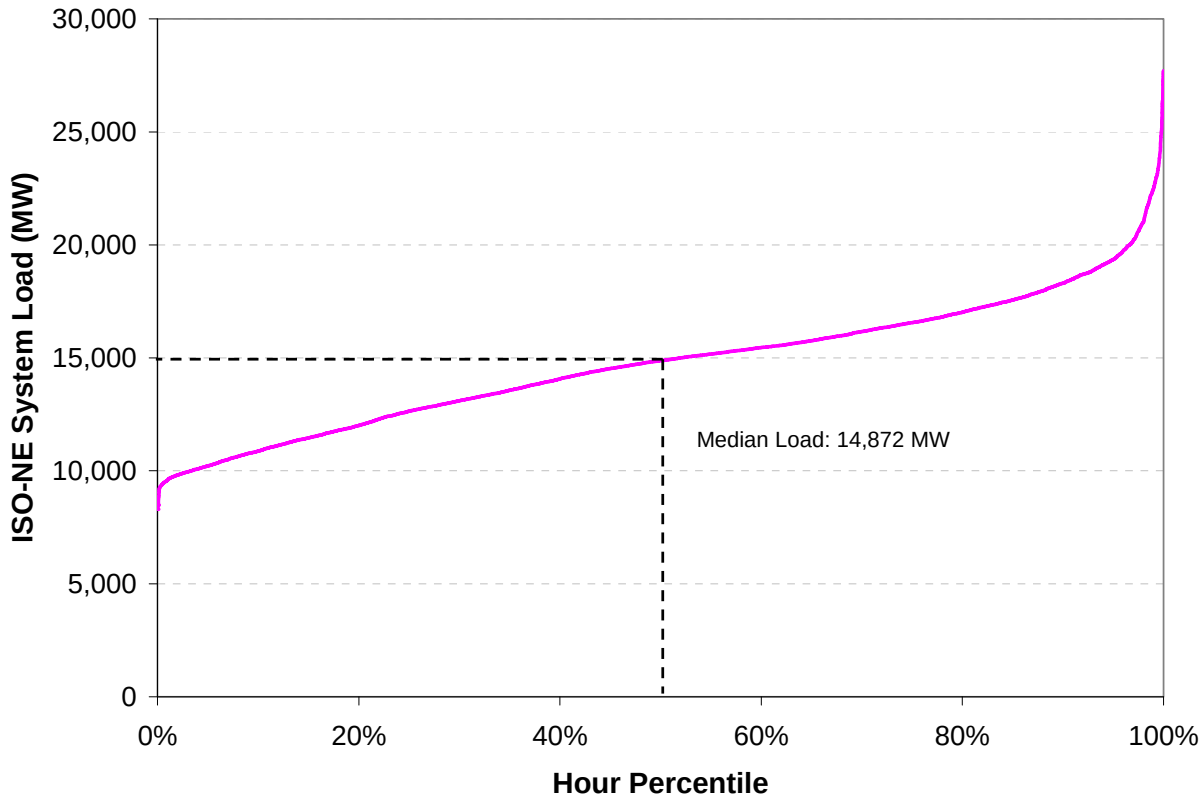


Q59. Can you estimate the approximate impact of the VY Station's retirement on market energy prices without chronological dispatch simulation modeling?

A59. Yes. As illustrated in Figure 2, ISO-NE's median, *i.e.* 50th percentile, system load in 2011 was 14,872MW, *i.e.* ISO-NE's system load was above that median value for one-half of the time and was below that median value for one-half of the time.

Figure 2: 2011 ISO-NE Load Duration Curve

(Source: ISO-NE)



At this point of 14,872MW on the energy bid curve (Figure 1), the marginal offer price was $45.00/MWh (as read off the vertical axis). If the VY Station was retired, it would have the effect of removing 604MW of the VY Station's supply from the energy market,

which would be equivalent to shifting the energy bid curve to the left by 604MW and raising the marginal offer price to the level of 15,476MW (= 14,872MW + 604MW). At this higher system load, the marginal offer price was $46.00/MWh, an increase of $1.00/MWh.

Next, I consider the proportion of the amount of energy that the Vermont utilities obtain from the wholesale energy market to their total energy procurement. GMP (now including CVPS) obtains most of its energy supplies from (i) its own resources and (ii) through PPAs and bilateral agreements that ordinarily lock in energy prices. According to GMP's 2013 Projected Sources of Energy web page, GMP expects to purchase about 4.3% (= 30.8% Other Sources * 14% from ISO-NE) of its energy requirements from ISO-NE in 2013. Hence, the actual impact of the VY Station's retirement on the energy component of the electricity bill for Vermont ratepayers could be as little as approximately $0.000043/kWh (= $1.00/MWh * 4.3%), an insignificant increase. Based on GMP's overall 2011 electricity rate of 12.81 cents/kWh (from GMP's web site), the increase would be an insignificant 0.03% (= $0.000043/kWh / $0.1281/kWh).

Vermont's second-largest utility, Vermont Electric Cooperative ("VEC"), also relies on its own resources and PPAs. According to its 2012 Integrated Resource Plan, "This assessment indicated that from 2012 through 2014, VEC's net energy needs are well covered with existing resources with only a small portion of its projected load being exposed to market prices."

Q60. Can you explain this in more general terms?

A60. It is important to maintain perspective on the VY Station in relation to the ISO-NE energy market. ISO-NE's peak system demand in 2011 was 27,707MW (*see* Figure 1). Given the VY Station's capacity of 604MW (summer rating), equivalent to just 2.2% of ISO-NE's 2011 system peak, the VY Station's retirement may not be significant in terms of affecting market energy prices.

It is also important to maintain a clear perspective on the importance of the VY Station in relation to the Vermont utilities sources of energy. GMP and CVPS (now merged into GMP) have historically been the two largest electric utilities in Vermont and have obtained their electric energy from multiple sources.

According to the GMP website, in 2011 the two utilities obtained 46.2% of their energy from the VY Station and Millstone 3 either through an ownership interest or through PPAs, 32.2% from Hydro-Québec through a PPA, 10.5% from their own and other hydroelectric plans, 6.1% predominantly from other PPAs, and the remaining 5.2% from other sources. It is clear that the Vermont utilities obtained the majority of their energy supplies from their own assets or from PPAs with other generators and did not rely much on wholesale market energy purchases in 2011.

The Vermont utilities will continue to be insulated from any fluctuations in market energy prices in the future after the VY Station's retirement. According to the GMP website, in 2013 the combined utility expects to obtain 6.5% of its energy supplies from Millstone 3 and Seabrook either through an ownership interest or through PPAs, 34.5% from Hydro-Québec through a PPA, 12.3% from its own and other hydroelectric plants, 9.3% from its own wind projects, 30.8% predominantly from other PPAs, and the

remaining 6.6% from renewable resources. Changes in market energy prices will not significantly affect GMP's ratepayers.

Q61. Turning now to ISO-NE's wholesale capacity market, does the VY Station participate in the FCAs?

A61. In the past, Entergy has bid the VY Station's capacity into the annual FCAs. However, in the last three FCAs for Commitment Periods 2013-2014, 2014-2015, and 2015-2016, Entergy submitted de-list bids to avoid any capacity supply obligation if the market capacity price was too low. Two of those de-list bids were accepted, primarily because ISO-NE had more than enough capacity to meet its ICR and satisfy its reliability criteria.

Q62. Please describe the extent of ISO-NE's capacity surplus.

A62. In FCA #4 for 2013-2014 and FCA #6 for 2015-2016, ISO-NE had more capacity, even without the VY Station, than was required to meet New England's ICR. As illustrated in Table 1 below, FCA #4 had 5,374MW of surplus capacity over ISO-NE's ICR, and FCA #6 had 2,853MW of surplus capacity over the ICR without the VY Station. In Commitment Period 2015-2016, the ISO-NE capacity surplus would have been even greater if the VY Station had cleared FCA #6.

ISO-NE also had a capacity surplus in FCA 5 for 2014-2015, including the VY Station. These FCA results clearly indicate the significant extent of the capacity surplus in New England.

Table 1: ISO-NE Forward Capacity Market Auction Results

FCA	Commitment Period	Surplus	VY Cleared	VY Status
#1	2010 – 2011	2,047MW	Yes	CSO
#2	2011 – 2012	4,755MW	Yes	CSO
#3	2012 – 2013	5,031MW	Yes	CSO
#4	2013 – 2014	5,374MW *	De-list Bid Accepted	No CSO
#5	2014 – 2015	3,718MW	De-list Bid Rejected	CSO
#6	2015 – 2016	2,853MW	De-list Bid Accepted	No CSO

** The surplus reported in FCA #4 includes the VY Station's capacity*

Q63. Would capacity payments made by Vermont ratepayers have been any different if the VY Station had cleared FCA #6? Did the VY Station affect capacity prices in any of the previous FCAs?

A63. No, Vermont ratepayers would not pay a different capacity price if the VY Station had cleared FCA #6. In fact, the VY Station did not make any difference in market capacity prices in the past few FCAs because the capacity surplus caused those FCAs to clear at the floor price. Thus Vermont ratepayers have not benefited from lower market capacity prices due to the VY Station. As long as the FCM floor price mechanism and capacity surplus persist in New England, the VY Station may not make any difference in the market capacity payments made by Vermont ratepayers. When the floor price mechanism is eliminated, the amount of the surplus capacity may become a factor determining the price suppression effect on the FCA clearing prices.

Q64. Did you review the prefiled testimony of the Entergy witnesses in this proceeding addressing economic and rate aspects of the VY Station?

A64. Yes, I reviewed the testimony of Mr. Tranen, Mr. Potkin, and Dr. Lester related to this issue.

Q65. Did they address the economics and rate impacts of continued operation of the VY Station?

A65. Yes, they did. Mr. Tranen stated on page 20 of his testimony that "[t]he generation of the VY Station reduces the ISO-NE market clearing price for energy as compared to the price level if gas-fired generation took the place of the VY Station in the ISO-NE dispatch." Mr. Potkin on page 18 of his Prefiled Testimony repeats Mr. Tranen's statement.

Q66. Do you agree with Mr. Tranen's position on the VY Station's impact on market energy prices?

A66. Not exactly. As I explained earlier, any impact of the VY Station on market energy prices in the near term depends entirely on the shape of the energy bid curve in the segment where the energy bid curve equals ISO-NE demand. If the energy bid curve is essentially flat in that segment, market energy prices would be unaffected either by the VY Station's operation or its retirement. The VY Station's impact on market energy prices is independent of Mr. Tranen's scenario in which "…gas fired generation took the place of the VY Station…" if the segment of the energy bid curve is flat. The flat segment of the energy bid curve in Figure 1 below16,000MW could be due to the large amount of gas-fired combined cycle generation in New England and their similar configurations, efficiencies, and fuel costs.

Q67. How much gas-fired combined cycle capacity is there in ISO-NE, and why would these resources bid similar energy prices?

A67. According to the 2012 CELT report, there are 8,693MW of gas-fired combined cycle generation and 2,722MW with gas and oil fuel capability that together are equivalent to 35% of ISO-NE's total installed capacity. Given their similar configurations (often two gas turbines with heat recovery steam generators plus a single steam turbine generator), efficiencies (reflecting compression, firing temperatures, and thus heat rates), and fuel costs (since gas is priced regionally, generators in New England pay similar gas prices under non-firm gas supply contracts), these combined cycle plants might well bid similar energy prices in the day-ahead market, flattening a large portion of the ISO-NE energy bid curve.

Q68. Would there be times when the market energy price would be higher without the VY Station?

A68. Yes, under certain high demand system conditions that occur periodically, *e.g.*, during heat waves in the summer or in winter during a prolonged cold snap, the ISO-NE system might require dispatch of much more expensive resources to make up lost VY Station generation. This situation corresponds to the right-hand side of my Figure 1.

Q69. Does Entergy's testimony quantify the percent of time a much more expensive resource would be required or estimate the impact on market energy prices?

A69. No, the Entergy testimony is vague and offered no quantitative support for the assertion that the VY Station's retirement would impact market energy prices.

Q70. Will the VY Station's retirement raise market energy prices in the long term?

A70. The long-term impact of the VY Station's retirement on market energy prices depends entirely on the composition of the ISO-NE generation portfolio in the future. In one outlook, there may still be a large amount of gas-fired combined cycle generation in the supply mix. In that scenario, the VY Station's retirement would have the impacts I described above and would depend on whether the energy bid curve is flat or upward sloping in the region of the system demand in a particular hour.

In a different outlook, the ISO-NE supply portfolio could change dramatically given the renewable portfolio standard ("RPS") requirements and energy policies of the six New England states, coupled with innovative renewable energy projects to develop onshore and offshore wind farms as well as to import hydropower from Québec. The availability of renewable wind and hydro resources, energy efficiency and demand resources, coupled with smart grid technologies in this scenario, has the potential to make dispatch of additional gas-fired generation less economical and unnecessary. Mr. Tranen's scenario in which lost VY Station energy would be replaced by gas-fired generation over the next twenty years is inconsistent with this outlook on long-term resource development.

Q71. What support did Mr. Tranen provide for his statement on page 20 of his prefiled testimony that "[t]he generation of the VY Station reduces the ISO-NE market clearing price for energy…" and what is your assessment of that support?

A71. Mr. Tranen stated that "[t]his conclusion is supported by a report presented to the Vermont General Assembly on January 31, 2006…" Thus the support for his statement is almost seven years old, and the underlying data it utilized must have been even older. To highlight the obsolescence of that report, I note that Mr. Tranen stated that "[t]he report estimated a reduction…for gas prices of $6/mmBtu." This assumption of underlying gas prices, a key determinant of gas-fired generator energy bids and thus of market energy prices, is inconsistent with recent gas prices in New England as well as with forecast prices.

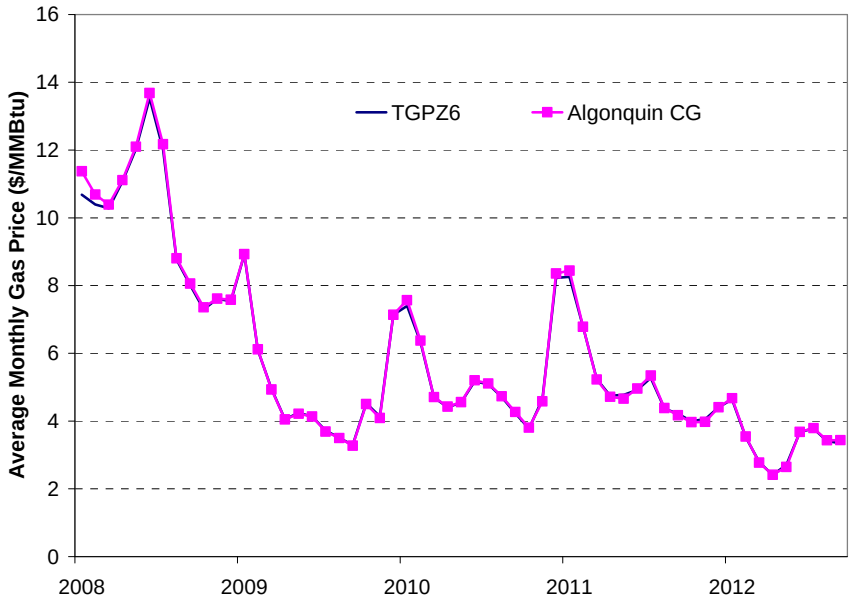
Q72. What have gas prices been for New England generators over the past few years?

A72. Although gas-fired generators each make individual arrangements to procure their fuel supplies, we know from experience that most of them pay a price that indexed to the prevailing spot market price. In New England, the two most relevant market indices are the Algonquin Citygates and Tennessee Pipeline Zone 6 prices. Six or seven years ago, gas prices of $6/mmBtu might have been reasonable. In today's market, a $6/mmBtu gas price is unreasonable due to a number of factors, primarily the production from shale formations, slow economic growth, and new transportation infrastructure. The figure below shows average monthly gas prices for Algonquin Citygates and Tennessee Zone 6 for the last several years. As the data indicate, average monthly gas prices have been

declining for the last four years. Average monthly gas prices have not exceeded $6/mmBtu since January 2011. For the period January 1, 2012 through September 30, 2012, the Algonquin Citygates and Tennessee Zone 6 prices have averaged $3.36/mmBtu and $3.37/mmBtu, respectively.

Figure 3: Historical Delivered Gas Prices in New England

(Source: Bloomberg LP)



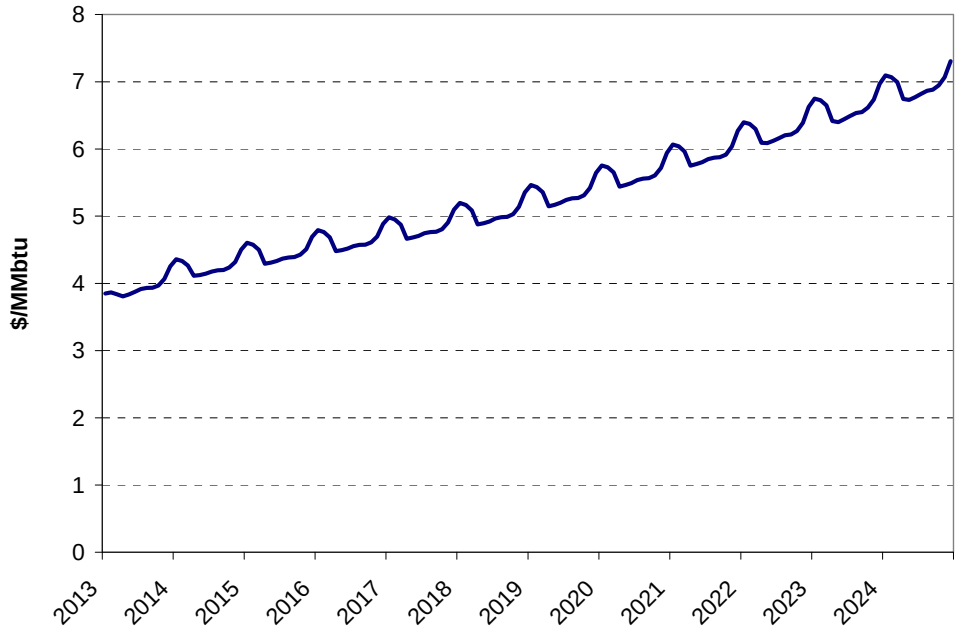
Q73. What is the long-term forecast for gas prices for generators in New England?

A73. Gas prices are expected to remain low for some time based on financial futures prices, one of the best sources of future gas prices. Futures gas prices for deliveries to New England are not liquid and thus too limited to be reliable. The most liquid market for gas futures is at Henry Hub, the benchmark gas price for the U.S. and North America as a whole, which provides a high degree of confidence. Futures for Henry Hub gas are

traded on the New York Mercantile Exchange and settle on a monthly basis. The Henry Hub forward curve for October 8, 2012 is graphed in Figure 4 below.

Figure 4: Long-Term Henry Hub Gas Price Forecast

(Source: NYMEX)



As Figure 4 indicates, Henry Hub gas prices are expected to rise slowly over the next decade and are not expected to rise above $6/mmBtu until 2021. Since gas must be transported from Henry Hub to New England via pipeline, the Algonquin Citygates and Tennessee Zone 6 prices are typically higher than Henry Hub prices; the difference is referred to as gas basis. The market's expectation of future basis is reflected in prices for basis swaps available via NYMEX. Recent settlements for Algonquin Citygates basis swaps indicate an expected basis averaging approximately $1.26/mmBtu for the twelve months of 2013, and the basis for Tennessee Zone 6 is similar. Assuming that these basis prices continue at approximately this

level for the foreseeable future, I would not expect gas prices in New England to rise above $6/mmBtu until 2019.

Q74. Do you agree with Mr. Tranen's statement on page 23 of his Prefiled Testimony that "If the VY Station is allowed to continue to operate, there will be less of a need for ISO-NE to operate fossil-fired generation?"

A74. Not in the long term. As I explained earlier, replacement power may be produced by non-fossil-fired resources, including renewable and hydroelectric plants, or offset by energy efficiency and demand resources. In particular, the benefits of access to Hydro Quebec resources are addressed in more detail by Mr. Robert Stein in his Prefiled Testimony.

Q75. Do you agree with Mr. Tranen's next statement on page 23 of his Prefiled Testimony that "[t]hus, the demand for other resources to reduce the usage of fossil fuels to generate electricity in New England will be reduced."

A75. No. Non-fossil-fuel resources, such as wind, hydroelectric, and other renewable resources, as well as energy efficiency and demand response resources, are being developed in New England to comply with the states' RPS and other state policy objectives. These standards and policies set development goals that must be met regardless of the VY Station's status. Its retirement would not affect the need or the amount of renewable and demand-side resources that will be built in New England.

Q76. Do you agree with Mr. Tranen's response in A:PSD:EN.1-60 (Exhibit PSD-SGP-12) in which he stated that "[r]enewable energy is predominantly wind, which does not have the baseload characteristics of a nuclear power plant and is therefore not a viable alternative to a nuclear power plant"?

A76. Not entirely. I agree with Mr. Tranen that wind will likely be the predominant renewable energy source in New England, but Mr. Tranen appears to consider the intermittent operation of a single wind plant as reason to disqualify wind generation as a baseload resource. However, a broad distribution of wind energy resources in and around New England would pool a diverse array of windscapes that would greatly reduce wind power intermittency in aggregate. Given wind's variable operating cost at virtually zero, wind resources would operate whenever available and be a market energy price-taker, key characteristics of nuclear plants and other baseload resources.

Q77. Do you agree with Mr. Tranen's statement on page 22 of his prefiled testimony that "…the operation of the VY Station will reduce transmission losses paid by Vermont consumers by virtue of having generation close to the Vermont load" and "[i]f the VY Station were not in operation, it is likely that the supply that would take its place for the region would be further away from the Vermont load…?"

A77. No. First, if Mr. Tranen is addressing new supply resources replacing the VY Station, New England has a capacity surplus and ISO-NE has determined that the VY Station is not required for reliability for nine of the next ten years. Thus there is no near-term need to replace the VY Station with a similar amount of capacity.

Second, if Mr. Tranen is implying that the VY Station's energy would be replaced from existing resources, the VY Station's retirement will not cause a particular energy flow from a specific generating location outside of Vermont to the VY Station substation. Instead, many marginal mid-merit, *i.e.*, load-following, power plants would contribute to replacing the VY Station's energy and power flows throughout the ISO-NE system would be subtly altered in accordance with security-constrained system dispatch and operation. Mr. Tranen's claims regarding the location of replacement resource and the consequent transmission losses are inconsistent with normal ISO-NE operations.

Q78. Will new resources be needed to replace the VY Station at some future time?

A78. Perhaps. Economics and market conditions that evolve over time will dictate the development of new capacity resources. ISO-NE has locational components in its energy and capacity market mechanisms to ensure that the right types of new resources are built when and where they are needed.

Q79. What is your estimate of the transmission losses increase if the VY Station is, in fact, replaced by resources located further away from Vermont customers?

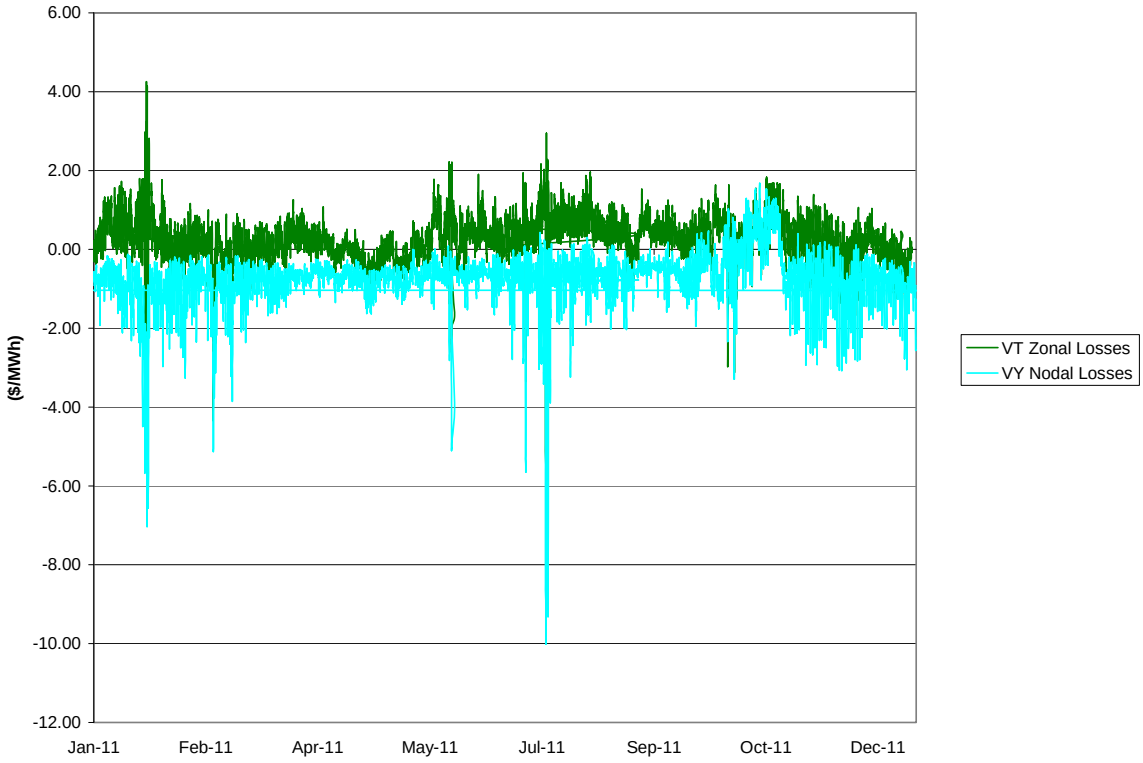
A79. Transmission losses, along with generation and congestion costs, are a small part of the wholesale energy costs that are passed through ratepayers, including Vermont ratepayers, through utility rates. The generation component dominates wholesale market energy prices, referred to Locational Marginal Prices ("LMPs"), which are calculated for various

nodes and load zones within ISO-NE. Transmission losses and congestion adders are very small relative to the wholesale energy cost.

I estimated that any increase in transmission losses due to the VY Station's retirement would be negligible compared to the total wholesale energy cost. The average 2011 Vermont Zonal LMP for Vermont ratepayers was $46.67/MWh, and transmission losses comprised $0.28/MWh, equivalent to 0.6% of that amount. Fig. 5 below illustrates the 2011 LMP loss components in the Vermont Load Zone and at the VY Station Node. During the VY Station's refueling outage from October 8, 2011 to November 3, 2011 when energy from the VY Station was effectively replaced by other resources, Vermont Zonal transmission losses averaged $0.44/MWh. Vermont Zonal transmission losses during the remainder of 2011 averaged $0.27/MWh. Parenthetically, the transmission loss components at the VY Station Node and the VT Zone converged, as would be expected, during the refueling outage.

The additional $0.17/MWh in transmission losses during the VY Station's refueling outage is equivalent to 0.4% of the average Vermont Zonal LMP of $46.67/MWh in 2011. My quick estimate based on these historical data indicates that the VY Station's operation does not significantly affect the transmission losses paid by Vermont ratepayers. Moreover, I already explained that the Vermont utilities are well-insulated from any market price changes due to having their own power plants and PPAs, so any higher wholesale prices due to transmission loss would be greatly diluted due to other supply sources.

Figure 5: Vermont Transmission Losses in 2011



Entergy Witnesses Exaggerated the Environmental Impacts of the VY Station's Retirement

Q80. Would the retirement of the VY Station affect power plant air emissions in New England?

A80. In the near term, retiring the VY Station would require other generators to operate for more hours and / or to operate at higher output levels. Some of these generators may be located in New England, and some may be located in neighboring markets (and therefore export power into New England). The bulk of the plants that would make up lost near term the VY Station generation would likely be mid-merit plants scattered throughout New England. Virtually all of these mid-merit plants would be gas-fired combined cycle plants.

Baseload plants, such as other nuclear, coal, or hydroelectric plants, typically operate close to full load whenever they are available, and thus cannot make up lost VY Station generation. (Some New England coal plants recently have been operating at reduced load during non-peak months as they have been displaced by combined cycle plants utilizing low-priced gas. Low gas prices, relative to oil, coal, and other fossil fuels, are the result of a gas glut primarily due to shale gas production and high storage levels after last year's mild winter. This cost discrepancy is not typical and may not persist over the long term.). Furthermore, there are currently no coal fired plants in Vermont, and the only plant capable of burning gas is the 50MW McNeil plant, which uses wood as its primary fuel. Peaking plants are typically dispatched to meet peak loads and in response to contingencies, and thus would not make up for lost VY Station generation.

Q81. Would these combined cycle plants produce more air emissions than the VY Station?

A81. Gas-fired combined cycle plants are relatively clean, but do emit carbon dioxide. Gas-fired combined cycle plants do not produce meaningful amounts of sulfur dioxide (the primary component of acid rain), nitrogen oxides (a precursor to ozone), carbon monoxide (a precursor to ozone), or volatile organic compounds (a precursor to ozone). According to the US Environmental Protection Agency website on Clean Energy / Air Emissions, the average coal plant produces roughly twice as much carbon dioxide, more than one hundred times more sulfur dioxide, and more than three times more nitrogen oxides than the average natural gas-fired plant on a unit of output basis. Oil-fired

generation produces less of these emissions than a coal-fired plant but still significantly more than gas-fired generation. Combined-cycle plants generally have lower emissions rates per generation than other gas-fired generators, so these comparisons are fairly conservative.

Q82. Are these combined cycle plants efficient?

A82. Yes, these plants are very efficient, converting over 50% of the energy content in the natural gas fuel into electricity. There have been a continuing series of improvements to the technology over the years, and a recent announcement by GE for its latest combined cycle configuration states that "… the FlexEfficiency 60 Combined Cycle Power Plant features a multi-shaft configuration that will generate a new level of baseload efficiency—greater than 61 percent—while also retaining high efficiency at part load." Even after downward adjustments for the latent heat of vaporization, *i.e.*, expressing efficiency in the more realistic term of higher heating value ("HHV") and taking actual site conditions into account, gas-fired combined cycle plant efficiencies can exceed 50%.

Q83. Why did you state that these combined cycle plants that would make up lost VY Station generation are scattered throughout New England?

A83. The New England bulk power system interconnects all of the major generating plants and loads through the high voltage transmission grid. ISO-NE, the power pool administrator, dispatches plants based on the lowest energy bids, subject to security constraints that account for transmission limitations and possible contingencies. Thus the combined

cycle plants that would make up lost VY Station generation in the near term could be located anywhere throughout New England. Consistent with my earlier statement, New England has a high percentage of modern, efficient, and relatively clean gas-fired combined cycle plants compared to other regions.

Q84. What about long term air emission impacts of the VY Station's retirement?

A84. It is difficult to predict what the long term air emission impacts will be. Renewable resources, energy efficiency, and demand response will certainly grow in New England. None of these resources emit air pollutants.

Q85. Which Entergy witness submitted prefiled testimony addressing environmental impacts associated with the VY Station?

A85. Dr. Lester and Mr. Tranen addressed environmental impacts in their testimony.

Q86. Do you agree with Dr. Lester's consideration of emissions from "…ancillary industrial activities…" on page 21 of his Prefiled Testimony, particularly "…emissions from associated nuclear-fuel-cycle operations...?"

A86. Dr. Lester is correct in that all generation sources have such ancillary emissions. However, it is difficult, if not impossible, to determine how far to go in consideration of ancillary emissions. For example, he refers to ancillary emissions from "…the extraction, processing, and enrichment of uranium and the disposal of nuclear waste," but does not acknowledge, for example, the emissions created to construct the mining and

transportation equipment used for those activities or the emissions to make the steel used in the construction of that equipment. Rather than extend the consideration of ancillary emissions *ad infinitum*, I would recommend focusing on the direct emissions and environmental impacts of continuing to operate or retiring the VY Station because those are identifiable and predictable.

Q87. Are Dr. Lester's findings concerning the replacement of lost VY Station generation over the short term consistent with your own findings?

A87. Many of Dr. Lester's findings are consistent with mine. On page 27 of his prefiled testimony, Dr. Lester concluded that "…natural-gas-fired power plants are the marginal source of supply in new England…" and "…their output [would] increase to make up the deficit" if the VY Station were retired. He highlighted the cost advantages of gas-fired combined cycle plants, including the low cost of shale gas, over the near term. I agree that gas-fired combined cycle plants will make up the bulk of lost VY Station generation in the short term, in large part due to their cost advantages. I emphasize, however, that these plants are scattered throughout New England, an important point that I will discuss later.

Q88. Are his findings concerning the replacement of lost VY Station generation over the long term consistent with your own findings?

A88. Not entirely. On page 27 of his prefiled testimony, Dr. Lester stated that "[i]n the longer run…an increasing share of the lost output from the VY Station would have to be

provided by new generating capacity." He generally dismissed demand-side and supply-side options. While I agree that gas-fired combined cycle plants may be the most cost-effective resource addition in the long run, we have to consider (i) ISO-NE's growing concern about our reliance on the gas pipeline network, and (ii) the inevitable development of renewable and demand-side resources to meet state RPS and policy goals.

Second, Dr. Lester did not address when new capacity would be required. In 2015-2016, New England will have a capacity surplus of 2,853MW, which is, according to Mr. Tranen, equivalent to six to seven years of load growth (see A.PSD:EN.2-139) (Exhibit PSD-SGP-13). That capacity surplus could well persist for much longer.

Q89. Were Dr. Lester's findings regarding the CO_2 emissions from replacement combined cycle generation consistent with your own findings?

A89. No. On page 27 of his prefiled testimony, Dr. Lester stated that, "[i]f all of the lost VY Station generation were made up by natural gas plants, the additional emissions of CO2 would be equivalent to 30% of the state's total current emissions of CO2 from all sources." However, Dr. Lester did not provide any calculations or workpapers to support his finding. It appears that Dr. Lester relied on Mr. Tranen who provided VY Station generation and CO_2 emission data on page 25 of his prefiled testimony. Mr. Tranen stated that VY Station annual generation is about 4,996,000MWh/year and that the ISO-NE marginal emission rate of 943 lbs of CO_2/MWh "…can be used as a rough proxy for the impact of a VY Station shutdown."

Mr. Tranen's first assumption concerning the VY Station's annual generation of 4,996,000MWh/year is slightly (1.8%) above the VY Station's actual 2011 generation of 4,907,355MWh last year as reported by the Nuclear Energy Institute ("NEI"). His assumption is somewhat optimistic compared to the most recent VY Station data but can be utilized for this purpose.

Mr. Tranen's second assumption on ISO-NE's marginal emission rate of 943 lbs of CO_2/MWh was taken directly from the ISO-NE "2010 Electric Generator Air Emissions Report" ("2010 MEA Report") he referenced. According to the 2010 MEA Report, "[t]he assumed marginal fossil units, on which the marginal emissions are based, consist of fossil units fueled with oil (including residual, distillate, kerosene, diesel and jet fuel), and/or natural gas." The 2010 MEA Report calculated the marginal CO_2 emission rate as follows:

$$\textit{Marginal Emission Rate}\,(lb/MWh) = \frac{\textit{Sum of Total Emissions}\,(lb)\,\textit{in Time Period from Marginal Fossil Units}}{\textit{Total Energy}\,(MWh)\,\textit{in Time Period from Marginal Fossil Units}}$$

However, the 2010 MEA Report marginal CO_2 emission rate that Mr. Tranen relied upon is much (18.3%) higher than the CO_2 emission rate of approximately 797 lbs of CO_2/MWh I estimate for a typical gas-fired combined cycle plant. The reason for this discrepancy may be that the 2010 MEA Report includes some oil-fired plants, which is inconsistent with Dr. Lester's assumption that "At present, natural-gas-fired plants are the marginal source of supply…"

Working with Dr. Lester's assumption, I calculate the CO_2 emission rate for a gas-fired combined cycle plant as follows. A typical gas-fired combined cycle plant has

a full-load heat rate of approximately 6700 Btu (HHV)/MWh, equivalent to a 51% efficiency and consistent with the efficiency data I presented earlier. According to Table 1.4 of the 2010 MEA Report, combusting natural gas releases 119 lbs. of CO_2/mmBtu (HHV). Multiplying these two values results in 797 lb-CO_2/MWh. Even after allowing for lower efficiencies at part-load combined cycle operation, use of the CO_2 emission rate from the 2010 MEA Report overstates the CO_2 impact of retiring the VY Station reported by Mr. Tranen and Dr. Lester.

Q90. Can you assess Dr. Lester's assertion on page 27 that "[i]f all the lost VY Station generation were made up by natural gas plants, the additional emissions of CO_2 would be equivalent to 30% of the state's total current emissions of CO_2 from all sources"?

A90. It is difficult to assess this assertion since Dr. Lester did not provide any supporting data and Mr. Tranen estimated the additional CO_2 emissions but did not provide Vermont's total CO_2 emissions. However, I question the comparison of any additional CO_2 emissions throughout New England with Vermont's CO_2 emissions. Vermont is a small state with a small population and few major generating stations. Thus Vermont's CO_2 emissions are quite small. The increased CO_2 emissions that would result from retiring the VY Station would occur throughout New England, consistent with Dr. Lester's statement on page 26 that "In the short run, a loss of electricity generated by the VY Station would have to be made up by unused existing generation capacity in the New England region or elsewhere." Comparing a region-wide CO_2 increase to Vermont's own CO_2 emissions is a mistake that grossly overstates the impact of retiring the VY Station.

Q91. Did Dr. Lester make this same comparison in his conclusion?

A91. Yes, he stated: "A decision to close the VY Station in 2012 would likely incur significant economic penalties and probably also result in considerable increases in the state's GHG emissions." In fact, most of the marginal plants that would make up the lost VY Station generation, *i.e.* gas-fired combined cycle plants, are scattered throughout New England. Moreover, Dr. Lester did not provided any support or quantify the "considerable increases in the state's GHG emissions."

Q92. Can you assess Dr. Lester's assertion on page 27 that "in the longer run, as demand increases and the existing capacity surplus shrinks, an increasing share of the lost output form the VY Station would have to be provided by new generating capacity."?

A92. I note that Dr. Lester refers to the existing capacity surplus, and it is important to understand how large and pervasive this surplus is. As I stated in earlier sections of my testimony, ISO-NE's capacity surplus has ranged between 2,047MW and 5,374MW per FCAs #1-#6 and a number of renewable and demand-side resources are being developed in response to states' RPS and policy initiatives. Thus his assertion that lost VY Station output will require new generating capacity is not supported for the foreseeable future.

Entergy Witnesses Exaggerates the Impact of VY Station's Retirement on Employment

Q93. What sort of socioeconomic impacts does the VY Station's operation provide to Vermont residents?

A93. As indicated in Mr. Heaps' Prefiled Testimony and his Ex. EN-RWH-1, The Economic Impact of VY Station on Windham County and Vermont prepared by witness Richard Heaps ("Economic Impact Report"), the operation of the VY Station provides employment to Vermont residents and associated payroll and property tax revenue to the State of Vermont. Mr. Heaps also attributed additional economic impacts to the plant, such as additional employment and tax revenues through multiplier effects.

Q94. Please explain the concept of multiplier effects.

A94. Multiplier effects represent additional economic impacts from direct employment and payroll, and are also referred to as indirect and induced effects.

The *indirect* effects represent additional economic activity from the supply chain and broader inter-industry purchases of supplies, materials, and services in order for a particular business to sell products or services given the new economic activity associated with a direct effect. For example, the local purchase of tools and parts for plant maintenance will lead to additional local purchases of raw materials, and local industrial and trucking labor.

The *induced* effects represent additional spending on goods and services by households as a result of more local income received in the forms of wages, salaries, and proprietor earnings. The induced effects also lead to further rounds of indirect effects until a new economic equilibrium is found.

Q95. What are your findings concerning the VY Station's employment benefits?

A95. It is difficult to determine exactly the VY Station's employment benefits given the facts that have been presented in this case. According to pages 10-11 of the Economic Impact Report, Entergy employs 627 workers directly (623 Entergy employees and 4 contract employees), plus the VY Station created an additional 672 indirect and induced jobs in Vermont, a total of 1,299 jobs. According to the Economic Impact Report, "[t]his implies an employment multiplier of 2.07."

I am concerned that this employment multiplier may not be accurate. According to the second bullet on page 11 of Mr. Heaps' Economic Impact Report, "…additional jobs are created across the New Hampshire and Massachusetts borders, but are not counted in this figure." Thus Mr. Heaps' estimate of 672 additional jobs excludes indirect supply chain purchases from out-of-state companies. Nuclear plants require specialized tools, parts, and equipment, as well as contracted maintenance and refueling services. I would anticipate that most of these supply chain purchases are out-of-state, especially since the VY Station is located so close to Massachusetts and New Hampshire. Thus Mr. Heaps presented what I would consider to be a partial employment multiplier, and the total employment multiplier would have to be considerably higher than 2.07 when out-of-state purchases and spending are included, if Mr. Heaps's analysis were correct.

Q96. Is the partial employment multiplier of 2.07 consistent with estimates in similar studies?

A96. Considering the geographical peculiarities of the study area that is being investigated, a partial employment multiplier of 2.07 seems rather high. I reviewed similar economic

benefits studies for nuclear power plants for comparison purposes. In Table 2 below, I have summarized my review of several nuclear plants' estimated employment impacts at the state level.

Table 2: Estimated State Employment Impacts of Nuclear Power Plant Operation

Plant Name	Study Year	State	Direct Jobs	Total Jobs	Multiplier
PPL Susquehanna[1]	2006	PA	1,528	4,167	2.72
Millstone[2]	2002	CT	1,401	3,247	2.31
Grand Gulf[3]	2006	MI	621	1,316	2.12
Exelon Limerick[4]	2011	PA	826	1,426	1.72

The VY Station's partial employment multiplier is similar to that of these studies, but encompassed a much smaller study area. Given the small size of Vermont, significant amount of workers commuting from out of state, and close proximity of out-of-state businesses, the additional employment created by the VY Station's operation estimated by Mr. Heaps seems rather high.

Q97. Returning to the VY Station jobs in Vermont, how many of the direct jobs are held by Vermont residents?

[1] Economic Benefits of PPL Susquehanna Nuclear Power Plant, November 2006, Nuclear Energy Institute.

[2] Economic Benefits of Millstone Power Station. 2002, Nuclear Energy Institute.

[3] Economic Benefits of Grand Gulf Nuclear Station. December 2006, Nuclear Energy Institute.

[4] The Economic Benefits of Exelon Nuclear's Limerick Generating Station. May 2011, Johnathan Lesser, Continental Economics, Inc.

A97. According to footnote 13 in the Economic Impact Report, about 40% of the VY Station's direct workers actually reside in Vermont, and about 60% of the VY Station workers reside in Massachusetts and New Hampshire. In spite of being consigned to a footnote, this breakdown is key when determining the economic benefits of the VY Station "to the state and its residents."

Q98. How many of the VY Station's indirect and induced jobs are held by Vermont residents?

A98. That information was not provided in the Economic Impact Report. Given that less than half of the VY Station's jobs are held by Vermont residents, it is unlikely that Vermont residents would hold all of the 672 indirect and induced jobs.

Q99. Would all of the Vermont residents currently working at the VY Station lose their jobs if the VY Station were retired?

A99. No, some of them would continue working at the VY Station to monitor the plant, site, and spent fuel, transfer the spent fuel into dry casks, and provide security services. In addition, at some point workers would have to be hired to dismantle the plant and restore the site. Mr. Heaps evaluated the loss of jobs under three scenarios: (i) 2032 Prompt Decommissioning, (ii) 2032 Deferred Decommissioning, and (iii) 2013 SAFSTOR.

Q100. What are your findings regarding Mr. Heaps' job loss evaluation under his third scenario of 2013 SAFSTOR?

A100. According to page 19 of the Economic Impact Report, if the VY Station is retired in 2012 and put into SAFSTOR, "[t]he job decline is somewhat offset by the jobs needed at the power station to put it into SAFSTOR mode. From 2013 to 2018, employment in Windham County is 625 to 1050 less than the baseline depending on the level of spending…" I note that Mr. Heaps defined the baseline as the continued operation of the VY Station. Continuing on page 19, Mr. Heaps estimates that from 2019 to 2066 the loss of jobs would be from 1,150 to 1,350 below the baseline. This peak job loss of 1,350 requires some clarification as Mr. Heaps had estimated a total of 1,299 VY Station jobs created by the VY Station. It would seem, therefore, that in a scenario where the VY Station was not operating, 1,299 jobs lost would be the upper bound. In this case, Mr. Heaps also did not differentiate between lost jobs held by Vermont residents and out-of-state residents.

Q101. What is the definition of a "job" in Mr. Heaps' Prefiled testimony?

A101. According to A.PSD.EN.2-109 (Exhibit PSD-SGP-14), "[i]n Mr. Heaps' testimony, when he refers to any employment impact obtained from the REDYN model, Mr. Heaps is using the Bureau of Economic Analysis (BEA) concept of employment and a 'job.' These jobs are not full-time equivalents. According to BEA definitions, "full-time and part-time jobs are counted at equal weight." This definition ignores the difference between full-time and part-time jobs, so the REDYN estimate of jobs created may not only be restricted to in-state employment, it may represent an upper bound on job creation in terms of full-time equivalents.

Q102. Does Mr. Heaps' testimony accurately reflect the employment benefits afforded by the operation of the VY Station?

A102. Mr. Heaps fails to make a distinction between employment in Vermont and employment of Vermont residents, which makes it difficult to assess the economic benefits conferred on the state and its residents as required by statute. In that context, Mr. Heaps is likely overstating the employment benefits of the VY Station as they should be framed in this case.

Q103. Did other Entergy witnesses provide similar testimony about VY Station employment benefits?

A103. Yes, Mr. T. Michael Twomey discussed employment and tax benefits on pages 11-13 of his Prefiled Testimony. Mr. Twomey cites many of the same employment statistics cited by Mr. Heaps, and also did not note that only 40% of the permanent direct workers actually live in Vermont. Similarly, Mr. Twomey stated that "…Entergy VY Station employs roughly 600 to 1200 contract personnel during refueling outages, which occur every 18 months," but he did not note how many, if any, of those contract personnel actually live in Vermont.

Q104. Does this conclude your testimony?

A104. Yes, at this time.